

## ON THE RELATIONSHIP BETWEEN SELF-INJURIOUS BEHAVIOR AND SELF-RESTRAINT

RICHARD G. SMITH, BRIAN A. IWATA, AND TIMOTHY R. VOLLMER

THE UNIVERSITY OF FLORIDA

AND

GARY M. PACE

DEBOSKY & ASSOCIATES, SARASOTA, FLORIDA

Many individuals who exhibit self-injurious behavior (SIB) also exhibit self-restraint. Three hypotheses about the determinants of self-restraint have been suggested: (a) Self-restraint is maintained by escape from or avoidance of aversive aspects of SIB, (b) self-restraint and SIB are members of the same functional class, and (c) self-restraint and SIB are functionally independent. This study examined a method by which the relationship between self-restraint and SIB may be investigated using functional analysis. Data were collected on the self-restraint and SIB exhibited by 5 mentally retarded males, while conditions suspected to maintain SIB were manipulated. Results suggested that self-restraint, like SIB, may be maintained by idiosyncratic contingencies. Implications of an understanding of self-restraint for the analysis and treatment of SIB are discussed, as are some general possibilities for future research.

DESCRIPTORS: functional analysis, self-injurious behavior, self-restraint

A frequently reported correlate of self-injurious behavior (SIB) in mentally retarded individuals is a class of behaviors called *self-restraint* (Baroff & Tate, 1968). Typically observed topographies of self-restraint include entanglement of limbs in clothing, furniture, or body parts; these behaviors are generally incompatible with the individual's SIB and by appearance seem "designed to prevent . . . those self-injurious behaviors" (Silverman, Watanabe, Marshall, & Baer, 1984, p. 545). Prevalence estimates of self-restraint in individuals who engage in SIB range from 10% (Favell, McGimsey, & Jones, 1978) to 50% (Bruhl, Fielding, Joyce, Peters, & Wiesler, 1982).

Although self-restraint does seem to reduce SIB, it is problematic in its own right. For example, Favell et al. (1978) demonstrated that the oppor-

tunity to engage in restraint may become positively reinforcing and suggested that, if not systematically controlled, self-restraint could maintain inappropriate responses. Sommers (1983) raised the possibility that the SIB of some clients may be maintained by contingent restraint. Others (Baroff & Tate, 1968; Pace, Iwata, Edwards, & McCosh, 1986; Rojahn, Mulick, McCoy, & Schroeder, 1978) have observed that self-restraint may become the dominant response in an individual's repertoire, which may reduce the frequency and quality of social interactions and may interfere with the acquisition and performance of appropriate behaviors. Extreme cases of chronic self-restraint may entail even more serious risks, such as muscular atrophy and arrested motor development. In such cases, the natural (though usually remote) outcomes for self-restraint are similar to those for SIB and can significantly reduce an individual's overall quality of life.

Data from studies on the treatment of SIB and self-restraint have suggested three hypotheses about the functional properties of self-restraint. The observation that SIB and self-restraint often are negatively correlated has led some researchers to sur-

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mise that self-restraint is maintained by escape from, or avoidance of, SIB (e.g., Baroff & Tate, 1968; Rojahn *et al.*, 1978). This suggests that SIB, although maintained by reinforcing consequences, also has aversive aspects over which the individual has inadequate control. Self-restraint, by terminating or avoiding these aversive aspects of SIB, is maintained by negative reinforcement. Simply stated, the *raison d'être* of self-restraint is the "control of SIB" (Rojahn *et al.*, 1978, p. 194).

An alternative to the above account is that self-restraint may have an effect on the environment similar to SIB (Pace *et al.*, 1986). That is, to the extent that self-restraint produces or is correlated with reinforcement similar to that produced by SIB (e.g., attention from others, reduction of aversive demands), it may be maintained by these consequences. Pace *et al.* (1986) further suggested that self-restraint may become the predominant response because it is usually a less effortful response and "does not produce the aversive (but tolerable) consequence of SIB" (p. 388).

A third possibility is that self-restraint and SIB may be functionally independent response classes. Although SIB and self-restraint may be related historically, perhaps through the use of restraint to control SIB, self-restraint may be maintained by contingencies unrelated to SIB. This possibility was suggested by Peterson and Peterson (1968), who noted that the topography of self-restraint exhibited by their subject (wrapping in a blanket) may have been maintained by warmth and comfort.

Although several recent studies and reviews have emphasized the importance of a better understanding of self-restraint (e.g., Fovel, Lash, Barron, & Roberts, 1989; Isley, Kartsonis, McCurley, Weisz, & Roberts, 1991), few investigations have pursued a systematic analysis of its functional properties and its relationship with SIB. Rojahn *et al.* (1978) reduced the SIB of 2 mentally retarded men through the introduction of clothing that permitted self-restraint. Although the authors argued that negative reinforcement, through the termination of SIB, maintained their subjects' self-restraint, the results of this study would equally support alternative ac-

counts. That is, self-restraint may have been functionally unrelated to SIB, or may have been a member of the same functional class as SIB and simply competed effectively with it.

Silverman *et al.* (1984) attempted to analyze the relationship between SIB and self-restraint by using protective clothing to reduce the SIB of a retarded male who exhibited self-restraint. Observed reductions in both SIB and self-restraint were interpreted by Silverman *et al.* as consistent with the negative reinforcement hypothesis; however, it is possible that the protective garments (a padded helmet and padded slippers) were functionally equivalent to self-restraint, thereby confounding the results. Perhaps restraint was a conditioned reinforcer for SIB (cf. Favell *et al.*, 1978). If so, the presentation of noncontingent restraint would eliminate the motivation for both self-restraint and, indirectly, SIB (as opposed to the suggestion that the motivation to engage in self-restraint was eliminated by reducing SIB). Close inspection of the data also reveals that high rates of SIB within sessions often were correlated with high rates of self-restraint, a result that might be predicted if self-restraint served to reduce SIB, but would be more consistent with the theory that SIB and self-restraint were members of the same functional class. Silverman *et al.* noted in their discussion that their data do not provide definitive support for their interpretation and suggested further research to identify more conclusively the environmental determinants of self-restraint.

The present study investigated the functional properties of self-restraint and SIB using a variation of procedures developed for the functional analysis of SIB (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). Two "subconditions" were imposed for 3 of 5 subjects over the "primary" conditions of the functional analysis. These subconditions, "restraint available" and "restraint unavailable," were used to analyze the relationship between self-restraint and SIB based on observed patterns of these behaviors within and across primary conditions and subconditions. Controlling the availability of self-restraint in this way can clarify the results of the

functional analysis of SIB and, in some cases, provides insight into the variables that maintain self-restraint.

For example, if self-restraint is maintained by escape from or avoidance of SIB, relatively lower rates of SIB should be observed when restraint is available than when it is not in the assessment condition in which SIB commonly occurs. Further, when restraint is available, relatively higher rates of self-restraint should occur in the assessment condition associated with SIB, compared to other conditions. In other words, if the function of self-restraint is to reduce SIB, then those conditions that produce SIB when self-restraint is unavailable should produce self-restraint and corresponding reductions in SIB when restraint becomes available. Those conditions that do not produce SIB when self-restraint is unavailable should not produce self-restraint when it becomes available. To illustrate, a subject whose SIB is observed to occur at high rates in the attention/restraint unavailable subcondition would be similarly motivated to engage in SIB in the attention/restraint available subcondition. However, because self-restraint is now an option, the subject will engage in that response, according to the negative reinforcement hypothesis, resulting in avoidance of or escape from the aversive consequences of SIB. In addition, because there is little motivation to engage in SIB in primary conditions other than the attention condition, levels of self-restraint will be low in other restraint available subconditions.

If self-restraint and SIB have similar functions, the assessment condition that produces SIB when restraint is unavailable may initially occasion lower rates of SIB when restraint is available because the two responses are interchangeable. However, as self-restraint fails to produce reinforcement that is contingent only on SIB, SIB should increase to levels similar to those seen in the restraint unavailable subcondition. Similarly, self-restraint would occur at relatively high rates (compared to other restraint available subconditions) in early sessions of the restraint available subcondition of that primary condition shown to maintain SIB, but would decrease

as the subject contacts the extinction contingency for self-restraint (there are no contingencies for self-restraint in any condition). To illustrate, if SIB and self-restraint are both maintained by attention from caretakers, when attention is available to the subject and self-restraint is not possible, the subject will engage in high rates of SIB compared to conditions in which attention is unavailable or in which self-restraint is possible and may produce attention. If, however, self-restraint is available but only SIB produces attention, self-restraint may compete with SIB initially (it will likely have a history as a successful competitor with SIB, because it is probably less effortful and does not produce immediately aversive outcomes), but would decrease as the subject learns that attention is not forthcoming. Also, self-restraint would not be likely to occur in restraint available conditions that are not discriminative for contingent attention.

Predicted trends for self-restraint maintained by events unrelated to SIB are less clear. Because no social consequences are programmed for self-restraint, it should be extinguished, unless it is maintained by automatic reinforcement (consequences not socially mediated) or by uncontrolled variables. In either of these cases, self-restraint would be unlikely to vary as a function of the conditions arranged for SIB, except to the extent that self-restraint may be artifactually reduced in the presence of SIB.

## METHOD

### *Subjects and Setting*

Five males, aged 13 to 36 years and diagnosed as profoundly retarded with chronic histories of both SIB and self-restraint, participated. Subjects lived in state residential facilities and entered the study at different times over a 4-year period. All subjects had been exposed to numerous unsuccessful treatments for SIB prior to their involvement in this study. Each subject also received treatment based on his assessment subsequent to this study; however, the courses and outcomes of those treatments are not described here. No subject had re-

ceived systematic analysis or treatment of self-restraint prior to this study, and in no case was self-restraint specified for systematic treatment by attending staff. Although some subjects appeared to respond to a few simple requests, none had expressive language.

Bill's SIB consisted of face and head hitting, and he restrained himself by entangling his hands in his shirt or pants. Jerry exhibited self-injurious hand biting, and his self-restraint consisted of wearing rigid arm splints that, while worn, made hand biting impossible. The splints were removable and were held in place by Jerry. Andy's SIB consisted of forceful blows to the face (face hitting), and he restrained himself by entangling his hands and arms in his clothing. Jim exhibited SIB that included hand and arm biting, scratching, head hitting and banging, and chin rubbing (rubbing his chin against his shoulder). Jim's self-restraint included entangling his arms in clothes and bed linens. Lonnie's SIB consisted of scratching, head hitting and banging, chin rubbing, and ear "boxing." Lonnie exhibited several topographies of self-restraint, including entangling his arms in his clothing, in furniture, and in other persons; holding objects in his hands; and placing and holding objects between his head and his shoulders.

Sessions were conducted in therapy rooms equipped with a one-way window through which observations took place (Bill, Jerry, and Andy) or in therapy rooms where observers stood in a corner of the room or in an adjacent room and observed through an open door (Jim and Lonnie). Rooms contained tables, chairs, toys, and educational materials as appropriate to the experimental conditions.

#### *Observation Procedures and Interobserver Agreement*

Formal response definitions were developed for each subject's topographies of SIB and self-restraint, and data were recorded on hand-held computers (either Hewlett-Packard Model HP71B or ASSISTANT Model A-102). The computers were programmed to permit calculation of the data as frequency of occurrence or percentage of 10-s intervals during which responses occurred. Frequen-

cies were calculated by dividing the total number of responses observed by the total session time. Percentage measures were calculated by dividing the number of intervals during which a response occurred by the total number of intervals and multiplying the result by 100.

Observations were conducted by graduate students, undergraduate students, or full-time therapists who had received extensive training in the use of observation instruments. A second observer independently scored 28.3% of the sessions. Agreement scores were calculated for frequency measures on an interval-by-interval basis by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Mean percentages of agreement for SIB and self-restraint across subjects were 92.5% and 97.4%, respectively.

#### *Experimental Design*

Subjects were exposed to each of either four or eight different conditions presented during 15-min sessions. Because it was impossible to construct "no restraint" conditions for Bill and Andy, they experienced only the four primary conditions; Jim, Jerry, and Lonnie were exposed to eight. The four primary conditions (attention, demand, alone, and play) were arranged in a multielement format (Sidman, 1960) and replicated the assessment protocol described by Iwata *et al.* (1982). In the present experiment, these assessment conditions were presented in the context of two subconditions. These subconditions, "restraint available" and "restraint unavailable," were designed to control for the effects of self-restraint. Each primary condition was presented in both the restraint available and restraint unavailable subconditions, resulting in a total of eight experimental conditions. The subconditions were arranged in an A-B format for Jerry and Lonnie, and in a multielement format for Jim.

#### *Primary Assessment Conditions*

**Attention.** The subject and therapist were present in a therapy room with toys and leisure materials available. The therapist directed the subject toward the materials, then proceeded to do paperwork or read a magazine. If the subject engaged in SIB, the

therapist approached and provided brief attention (3 to 5 s) in the forms of social disapproval, or concern and brief physical contact (e.g., response block or interruption). The therapist ignored all other responses by the subject. This condition was designed to assess whether positive (social) reinforcement was a maintaining variable for SIB.

*Demand.* The subject and therapist were present in a therapy room with educational materials available. The therapist presented learning trials to the subject approximately every 30 s, and used graduated prompts (verbal instruction, demonstration, physical guidance) at 5-s intervals if compliance did not occur. Compliance was reinforced with social praise. Contingent upon SIB, the therapist terminated the trial, turned away from the subject, and discontinued further demands for 30 s. Occurrences of SIB within 5 s prior to scheduled trials resulted in an additional 5-s delay. This condition was designed to determine whether SIB was maintained by escape from or avoidance of academic demand situations.

*Alone.* Subjects were placed in a therapy room alone with no toys or other materials. No social consequences were arranged for SIB. This condition was designed to determine whether SIB may be maintained by self-produced or automatic reinforcement, presumably of a sensory nature.

*Play.* This was a control condition, in which subject had continuous access to toys and games. The experimenter provided social reinforcement approximately every 30 s (given the absence of SIB for the previous 5 s). No demands were placed on the subject in this condition, and SIB had no programmed consequences.

#### *Restraint Manipulations (Subconditions)*

*Restraint available.* The subject had access to the restraint(s) identified in the preexperimental screening process. For Jerry, this involved access to his arm tubes, which he could put on or remove freely. For Bill, Andy, Lonnie, and Jim, this involved the presence of clothing and other items that were used as self-restraint materials. There were no programmed consequences for engaging in self-restraint; the therapists continued to conduct the ongoing primary condition when self-restraint oc-

curred. Further, the reinforcement contingencies for SIB identified in each primary condition were suspended if SIB occurred when the subject engaged in self-restraint. That is, social reinforcement (i.e., attention from therapists or escape from task demands) was unavailable when self-restraint occurred, eliminating the possibility of adventitious social reinforcement of self-restraint.

*Restraint unavailable.* In this subcondition, restraint materials were not available to the subject. For Jerry, this involved removal of access to arm tubes; for Lon and Jim, this involved removal of the clothing and other items used for self-restraint.

## RESULTS AND DISCUSSION

The results of Jerry's assessment are presented in the top panel of Figure 1. Jerry's assessment was arranged in a combined multielement and A-B format, with the restraint available conditions preceding the restraint unavailable conditions. When restraint materials (arm splints) were available, Jerry restrained himself at all times and never exhibited SIB. When restraint materials were unavailable, SIB occurred primarily in the demand condition, indicating that the behavior was maintained by escape from task demands. The functional properties of Jerry's self-restraint were less evident. The negative correlation between SIB and self-restraint seems consistent with the theory that self-restraint was maintained by escape from SIB; however, several sessions in each condition of the functional analysis were required to produce discrimination of the contingencies for SIB. These contingencies had not been experienced during the restraint available condition because Jerry never exhibited SIB. If restraint had a history of avoidance of SIB it may be expected to persist under changed conditions; a similar persistence of avoidance responding is commonly reported in basic behavioral research (e.g., Mazur, 1986). Only after a history with the contingencies for SIB might Jerry have been expected to emerge from restraint in conditions that were clearly discriminative for the absence of SIB.

If, however, SIB and self-restraint were members of the same functional class (i.e., if self-restraint was maintained by escape from aversive demands),

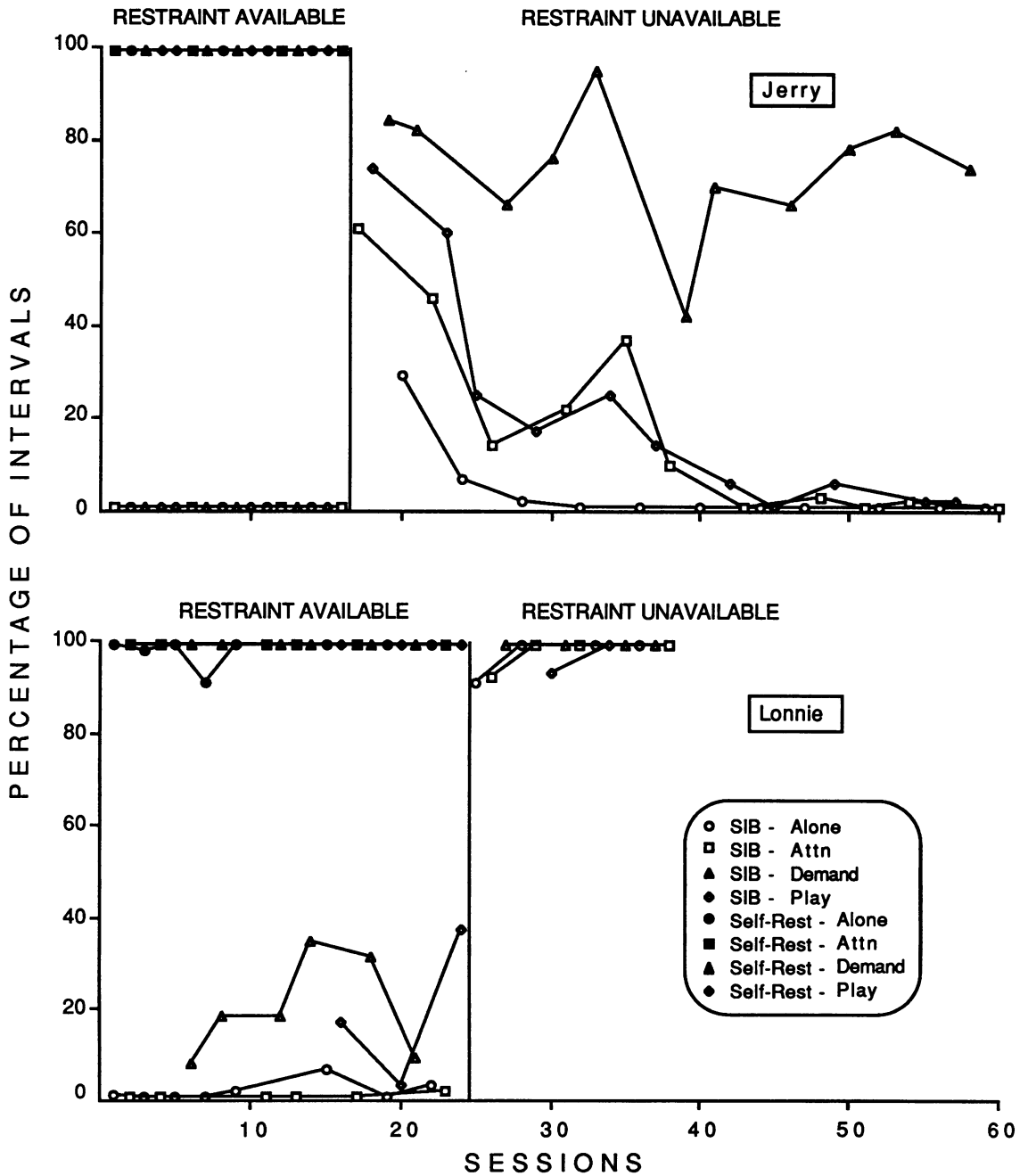


Figure 1. Percentage of intervals with SIB and self-restraint for Jerry (upper panel) and Lonnie (lower panel).

reductions in self-restraint would have been expected in all assessment conditions because of extinction in the demand condition, and because of the absence of an establishing operation (i.e., absence of aversive stimulation) in other conditions.

It may be argued that, if self-restraint was discriminative for the absence of demands (i.e., maintained by avoidance of demands), it may persist across conditions as previously described; however, extinction should have occurred in the demand con-

dition. The current data are not consistent with the similar function account of self-restraint. The functional independence hypothesis would also have predicted a generalized extinction effect, except in the unlikely case that wearing arm splints produced automatic reinforcement unrelated to the termination of SIB.

A reversal from the restraint unavailable to the restraint available condition would have further clarified the relationship between SIB and self-restraint. The negative reinforcement hypothesis predicts decreases in self-restraint in all but the demand condition, given the discrimination of the contingencies for SIB that occurred when restraint was unavailable. If, on the other hand, self-restraint decreased in the reversal condition, some form of social control is indicated.

The bottom panel of Figure 1 shows the data from Lonnie's assessment, which was conducted using a combined multielement and A-B design. Conditions of the functional analysis were arranged in a multielement design, first with restraint available, then with restraint unavailable. When restraint was available, it occurred almost continuously across assessment conditions (mean percentage of intervals across conditions was 99.5%). SIB rarely occurred when restraint was available, except in the demand condition. Informal observations revealed that Lonnie engaged in SIB nearly constantly when not restraining himself and suggested that SIB may have been artifactually produced in the demand condition. That is, in the demand condition, therapists occasionally required Lonnie to emerge briefly from restraint to complete tasks, presenting a potential confounding effect in the functional analysis of SIB. To control for this possibility, a movement/play condition was developed, in which a reinforcing food or drink (e.g., raisin, fruit juice) was placed on a table approximately 2 m from Lonnie on a fixed-time 30-s schedule. In order to pick up and ingest the item, it was necessary for Lonnie to emerge briefly from self-restraint (periods out of restraint were so brief that they were seldom reflected in the data). This condition produced levels of SIB similar to those observed in the demand condition. When self-re-

straint was unavailable, SIB occurred at high levels across conditions (mean percentage of intervals across conditions was 98.3%). It was necessary to terminate several sessions in this condition due to the possibility of severe tissue damage.

Although the near-perfect negative correlation between SIB and self-restraint is consistent with the negative reinforcement account of self-restraint, it is possible that access to self-restraint maintained SIB, as suggested by Sommers (1983). If self-restraint had acquired reinforcing properties (through contingencies related to or independent of those maintaining SIB), and if SIB reliably produced opportunities to self-restrain, then withdrawal of self-restraint materials would be expected to produce SIB across settings. Because the intensity of Lonnie's SIB required the early termination of several sessions (and subsequent availability of restraint materials), this reinforcement effect could be maintained throughout the assessment. As in Jerry's case, the extinction contingency in effect for self-restraint across conditions should have produced a general decrease in socially maintained self-restraint. Therefore, it appears that Lonnie's self-restraint was not maintained by socially mediated consequences.

Figure 2 shows the results of Bill's assessment. It was not possible to conduct Bill's functional analysis without access to self-restraint (Bill restrained himself in the clothes he wore); however, Bill's data reveal that his SIB was maintained by escape from task demands (Figure 2, top panel). The bottom panel of Figure 2 shows Bill's self-restraint during assessment sessions. Although high levels of self-restraint occurred across conditions during the first several sessions, responding decreased to below 20% of intervals in the attention, alone, and play conditions by the ninth session, and eventually stabilized below 10% of intervals. Self-restraint decreased in the demand condition as well; however, this decrease occurred more gradually across sessions.

Bill's data suggest that his self-restraint was functionally similar to SIB. The general decrease in self-restraint over the course of assessment indicates that the reinforcement maintaining self-restraint was so-

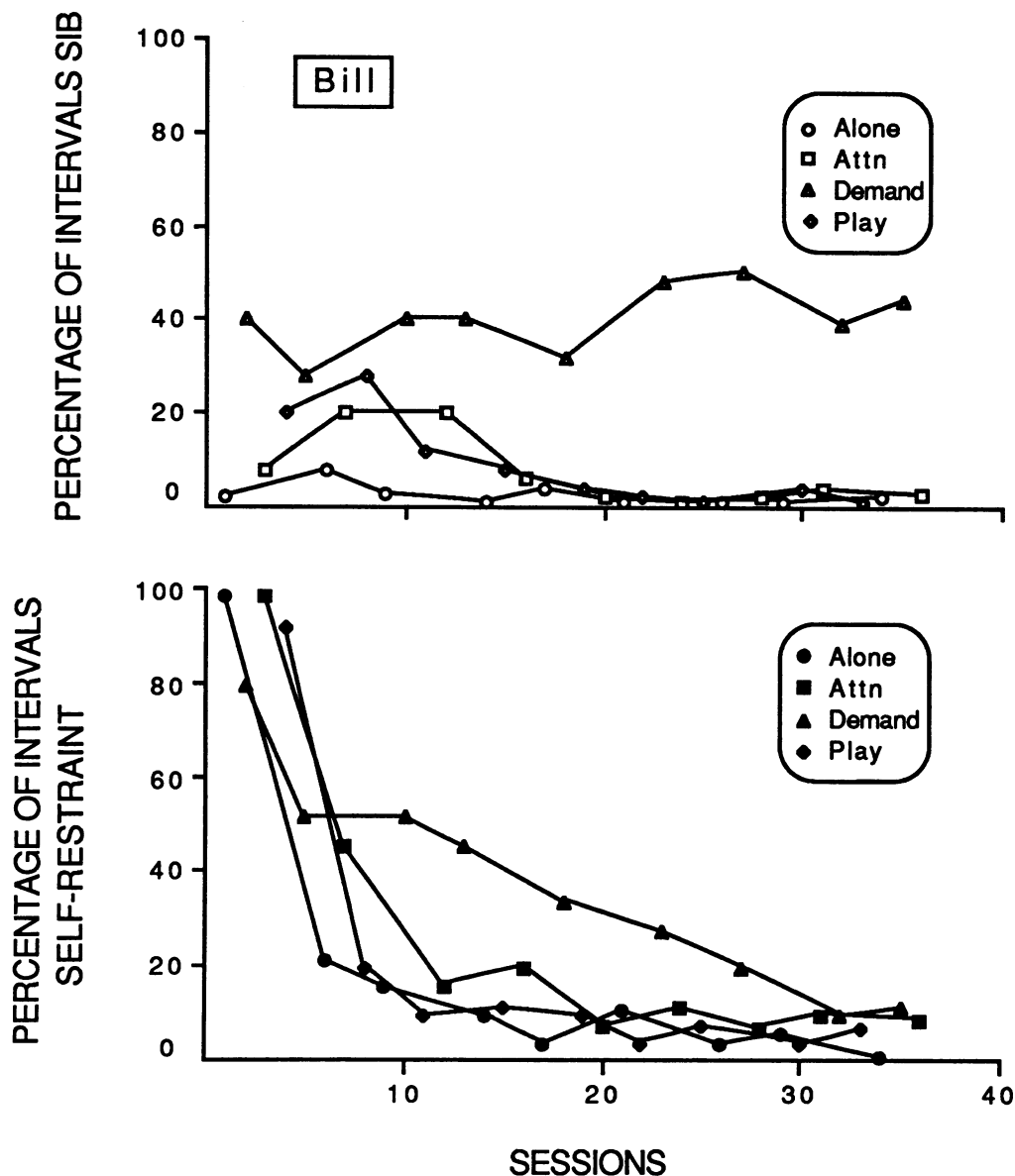


Figure 2. Percentage of intervals with SIB and self-restraint for Bill. The upper panel shows SIB; the lower panel shows self-restraint.

cially mediated. It is clear that self-restraint was not maintained by reductions in SIB; an inverse function between self-restraint and SIB did not occur. Further, if the variables maintaining self-restraint were different from those maintaining SIB, self-restraint would have decreased more rapidly in the demand condition, as it did in other assessment conditions. If, on the other hand, self-restraint and SIB were members of the same functional class,

then conditions that produce SIB would also be expected to produce self-restraint until discrimination of the extinction contingency for self-restraint was complete. The results of Bill's assessment support this interpretation of his self-restraint.

Figure 3 shows the results of Jim's assessment. When self-restraint was unavailable, Jim's SIB was quite variable and occurred in all conditions (top panel). No function of SIB is clearly revealed, al-



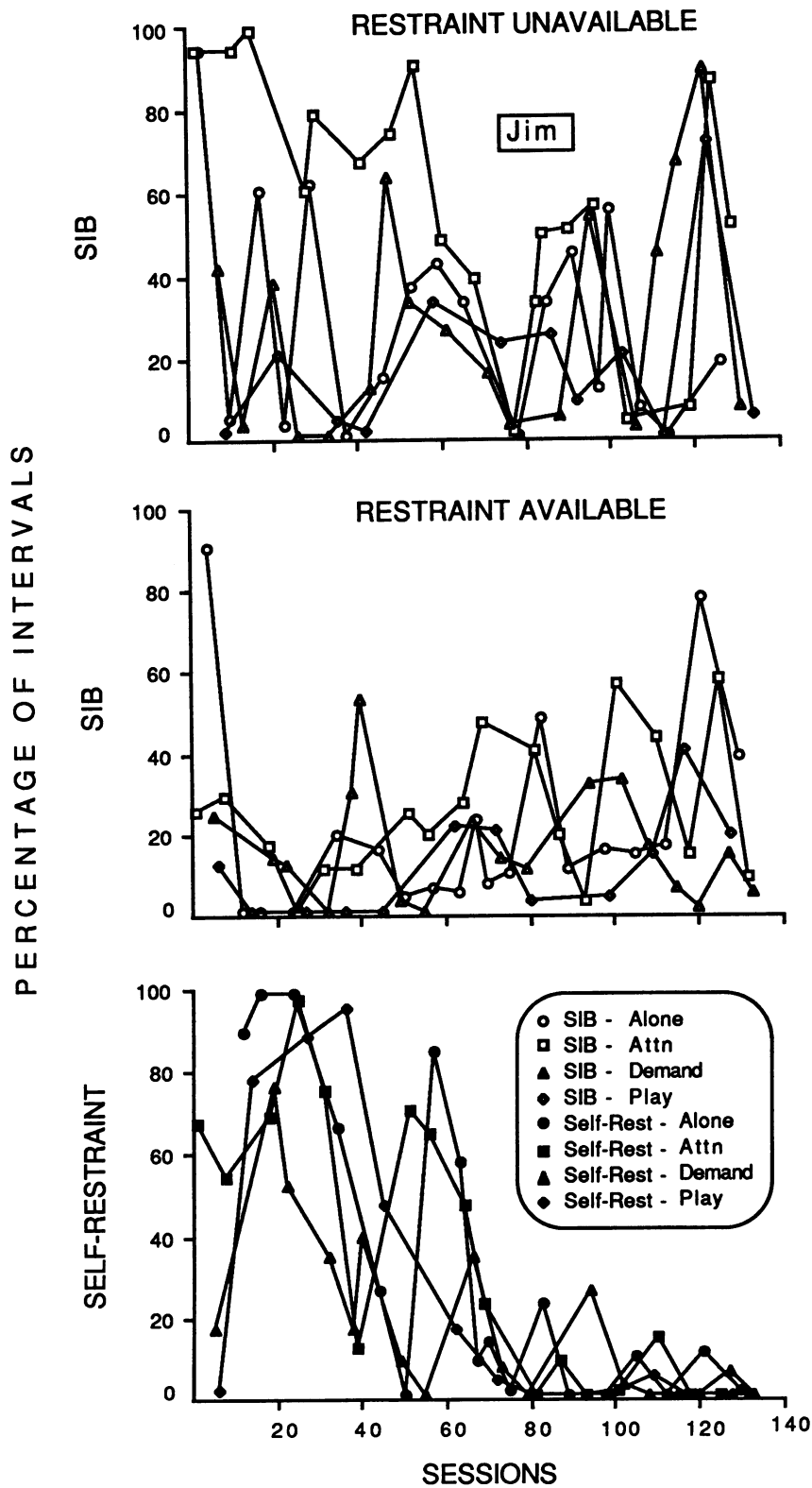


Figure 3. Percentage of intervals with SIB and self-restraint for Jim. The top panel shows SIB in the restraint unavailable condition. The middle panel shows SIB in the restraint available condition. The bottom panel shows self-restraint.

though condition means suggest that SIB may have been sensitive to positive reinforcement in the form of attention from therapists (mean percentage of intervals with SIB: attention, 57.6%; alone, 29.6%; demand, 28.6%; play, 18.5%). The middle panel represents Jim's SIB during sessions when restraint was available. Again, no clear function of SIB is evident, although a slight upward trend may have occurred. Condition means again suggest sensitivity to attention (mean percentage of intervals with SIB: attention, 25.6%; alone, 21.4%; demand, 16.7%; play, 11.6%). The bottom panel shows that Jim's self-restraint occurred at high levels across conditions in early sessions, but gradually decreased to near-zero levels during the course of assessment. This decrease occurred at roughly the same rate across conditions, suggesting a generalized extinction effect for self-restraint. These outcomes suggest that self-restraint was functionally unrelated to SIB, and that self-restraint was maintained by a socially mediated consequence. However, rank ordering of condition means shows correspondence between ordered means of SIB (in both restraint available and restraint unavailable conditions) and self-restraint (mean percentage of intervals with self-restraint: attention, 33.9%; alone, 32.6%; demand, 17.3%; play, 28.3%). This suggests a relationship between SIB and self-restraint, although the nature of this relationship is unclear. The data are clearly inconsistent with the negative reinforcement hypothesis, which predicts stable levels of self-restraint and SIB throughout assessment. Thus, although the data from Jim's assessment seem most supportive of independent functions of SIB and self-restraint, the absence of a clear function of SIB precludes a definitive statement.

The results of Andy's assessment are displayed in Figure 4. As previously noted, it was not possible to conduct a restraint unavailable condition for Andy. The top left panel shows the results of the functional analysis of SIB; because responding was undifferentiated across conditions, the functional properties of SIB are unclear. Similarly, the top right panel shows an undifferentiated pattern of self-restraint across conditions. The bottom four panels represent within-condition comparisons for

SIB and restraint, which show that SIB generally occurred at higher levels than self-restraint.

Because it was not possible to conduct Andy's functional analysis without access to self-restraint and because no clear function of SIB emerged in the assessment, inferences about the controlling variables for self-restraint are equivocal. During a number of sessions, self-restraint occurred at low levels while SIB occurred at high levels; these data are inconsistent with a negative reinforcement account of self-restraint. It is also unlikely that self-restraint was maintained by escape from task demands or attention from caretakers. Because neither of these consequences was arranged for self-restraint, extinction of self-restraint would be expected over the course of assessment. Because extinction did not occur and because self-restraint occurred across all assessment conditions, the interpretation (by default) that self-restraint served an automatically reinforcing function is tenable.

## GENERAL DISCUSSION

Results of this study suggest that self-restraint and SIB may enter into idiosyncratic functional relationships for different individuals. Although the data from Jerry's and Lonnie's assessments were most supportive of the hypothesis that self-restraint is maintained by escape from the aversive effects of SIB, the extinction of self-restraint seen during Bill's and Jim's assessments suggests socially mediated reinforcement for their self-restraint. Further, Bill's data were most consistent with the theory that self-restraint served a similar function to SIB, and Jim's data suggested different functions for the two behaviors. Thus, this study provides empirical support for each of the three accounts of the functional properties of self-restraint.

The importance of a procedure that clarifies the functional properties of self-restraint is seen in the finding that self-restraint, like SIB, may serve multiple functions whose identification may influence treatment decisions. For example, programmed reinforcement of self-restraint belonging to the same functional class as SIB may promote self-restraint as a temporary and less dangerous alternative to

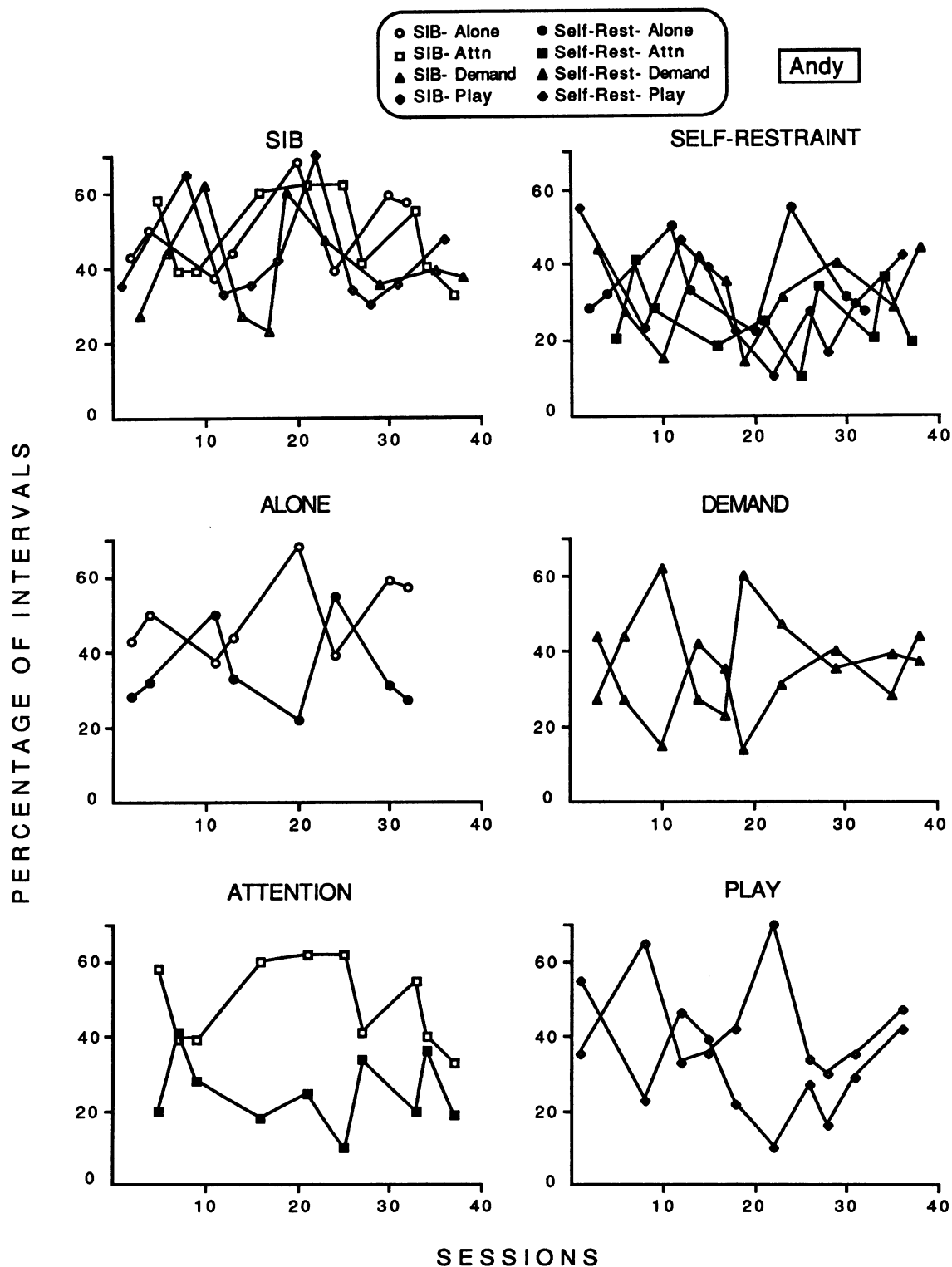


Figure 4. Percentage of intervals with SIB and self-restraint for Andy. The upper left panel shows SIB in all assessment conditions; the upper right panel shows self-restraint in all assessment conditions. The lower four panels show separate comparisons of SIB and self-restraint for each of the assessment conditions.

SIB. Replacement of self-restraint with a more appropriate response could then be achieved through the transfer of stimulus control with minimal risk to the subject, as demonstrated by Pace *et al.* (1986). However, in the case of self-restraint maintained by escape from the aversive aspects of SIB, interventions to reduce negatively reinforced self-restraint without concurrent efforts to eliminate SIB may leave clients "defenseless" against SIB.

The outcomes of Jerry's assessment suggest that, for some clients, it may be important to control for self-restraint when experimentally analyzing SIB. Only when self-restraint was not available was the function of Jerry's SIB apparent, and only in Bill's case was the function of SIB clearly evident in the presence of self-restraint. These data indicate that the controlling variables for SIB may be obscured by the occurrence of self-restraint. Thus, when possible, the functional analysis of SIB for individuals who also engage in self-restraint should be conducted without access to restraint materials.

Similarly, the controlling variables for self-restraint may be revealed only when manipulation of environmental contingencies produces specific response patterns of self-restraint relative to SIB. One direction for future research may be the development of methods to manipulate directly the outcomes of self-restraint; that is, to control experimentally the environmental variables thought to maintain self-restraint while holding SIB constant. Unfortunately, one account of the function of self-restraint—the negative reinforcement account—involves a variable that may be beyond experimental control; it may be impossible to arrange conditions under which self-restraint does not permit escape from SIB. Thus, as in the current experiment, it may be necessary to infer a negative reinforcement function of self-restraint when the absence of social consequences fails to extinguish self-restraint.

Another limitation of the current study is its failure to explore yet other explanations of self-restraint. For example, it has been suggested that self-restraint may be maintained by avoidance of social punishment often contingent upon SIB (this is actually a specific variation of the "different functions" account). This and other hypotheses of the

function of self-restraint may be reasonable; in fact, the current findings suggest that self-restraint may be sensitive to many different contingencies for different individuals. However, the current study was designed to address those explanations that have emerged from the research literature on this class of behaviors and that have some previous empirical support. More direct methods of investigating the function of self-restraint, as described above, might be adaptable for the analysis of alternative accounts of self-restraint.

Further identification of the behavioral mechanisms underlying self-restraint remains to be achieved. This study provides preliminary data suggesting that there are multiple determinants of self-restraint, and that each case of self-restraint may enter into idiosyncratic functional relationships. Our methodology provides a general framework for further refinement of both assessment and treatment.

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